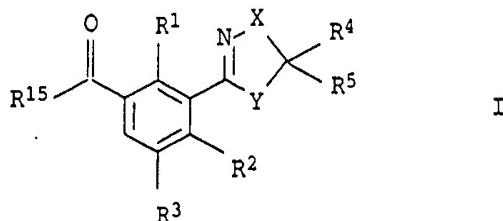


We claim

- 5 1. A 3-heterocyclyl-substituted benzoyl derivative of the
formula I

10



15

where the variables have the following meanings:

20 R¹, R² are hydrogen, nitro, halogen, cyano, C₁-C₆-alkyl,
C₁-C₆-haloalkyl, C₁-C₆-alkoxy, C₁-C₆-haloalkoxy,
C₁-C₆-alkylthio, C₁-C₆-haloalkylthio,
C₁-C₆-alkylsulfinyl, C₁-C₆-haloalkylsulfinyl,
C₁-C₆-alkylsulfonyl or C₁-C₆-haloalkylsulfonyl;

25

R³ is hydrogen, halogen or C₁-C₆-alkyl;

30 R⁴, R⁵

are hydrogen, halogen, cyano, nitro, C₁-C₄-alkyl,
C₁-C₄-alkoxy-C₁-C₄-alkyl, di(C₁-C₄-alkoxy)-C₁-C₄-
alkyl, di(C₁-C₄-alkyl)-amino-C₁-C₄-alkyl,
[2,2-di(C₁-C₄-alkyl)-1-hydrazino]-C₁-C₄-alkyl,
C₁-C₆-alkyliminoxy-C₁-C₄-alkyl, C₁-C₄-alkoxycarbonyl-
C₁-C₄-alkyl, C₁-C₄-alkylthio-C₁-C₄-alkyl,
C₁-C₄-haloalkyl, C₁-C₄-cyanoalkyl, C₃-C₈-cycloalkyl,

35

C₁-C₄-alkoxy, C₁-C₄-alkoxy-C₂-C₄-alkoxy,
C₁-C₄-haloalkoxy, hydroxyl, C₁-C₄-alkylcarbonyloxy,
C₁-C₄-alkylthio, C₁-C₄-haloalkylthio,

40

di(C₁-C₄-alkyl)amino, COR⁶, phenyl or benzyl, it
being possible for the two last-mentioned
substituents to be fully or partially halogenated
and/or to have attached to them one to three of the
following groups:

nitro, cyano, C₁-C₄-alkyl, C₁-C₄-haloalkyl,
C₁-C₄-alkoxy or C₁-C₄-haloalkoxy;

45

or

162

R⁴ and R⁵ together form a C₂-C₆-alkanediyl chain which can be mono- to tetrasubstituted by C₁-C₄-alkyl and/or which can be interrupted by oxygen or by a nitrogen which is unsubstituted or substituted by C₁-C₄-alkyl;

5

or

R⁴ and R⁵ together with the corresponding carbon form a carbonyl or thiocarbonyl group;

10

R⁶ is hydrogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxy, C₁-C₄-alkoxy-C₂-C₄-alkoxy, C₁-C₄-haloalkoxy, C₃-C₆-alkenyloxy, C₃-C₆-alkynyoxy or NR⁷R⁸;

15

R⁷ is hydrogen or C₁-C₄-alkyl;

20

R⁸ is C₁-C₄-alkyl;

X is O, S, NR⁹, CO or CR¹⁰R¹¹;

25

Y is O, S, NR¹², CO or CR¹³R¹⁴;

R⁹, R¹² are hydrogen or C₁-C₄-alkyl;

30

R¹⁰, R¹¹, R¹³, R¹⁴ are hydrogen, C₁-C₄-alkyl, C₁-C₄-haloalkyl, C₁-C₄-alkoxycarbonyl, C₁-C₄-haloalkoxycarbonyl or CONR⁷R⁸;

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or

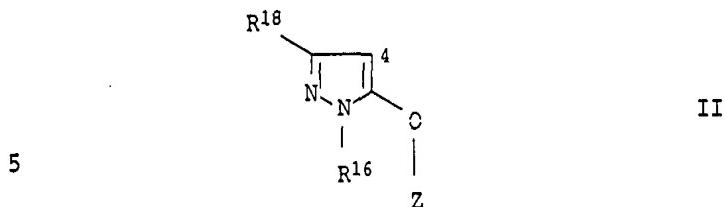
35

R⁴ and R⁹ or R⁴ and R¹⁰ or R⁵ and R¹² or R⁵ and R¹³ together form a C₂-C₆-alkanediyl chain which can be mono- to tetrasubstituted by C₁-C₄-alkyl and/or interrupted by oxygen or by a nitrogen which is unsubstituted or substituted by C₁-C₄-alkyl;

40

R¹⁵ is a pyrazole of the formula II which is linked in the 4-position

45



where

¹⁰ R¹⁶ is C₁-C₆-alkyl;

Z is H or SO_2R^{17} ;

15 R¹⁷ is C₁-C₄-alkyl, C₁-C₄-haloalkyl, phenyl or
phenyl which is partially or fully
halogenated and/or has attached to it one
to three of the following groups:
nitro, cyano, C₁-C₄-alkyl, C₁-C₄-haloalkyl,
C₁-C₄-alkoxy or C₁-C₄-haloalkoxy;
20

R^{18} is hydrogen or C_1-C_6 -alkyl;

where X and Y are not simultaneously sulfur;

with the exception of
4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1-ethyl-5-hydroxy-1H-pyrazole,
4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1,3-dimethyl-5-hydroxy-1H-pyrazole,
4-[2-chloro-3-(5-cyano-4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1,3-dimethyl-5-hydroxy-1H-pyrazole,
4-[2-chloro-3-(4,5-dihydrothiazol-2-yl)-4-methylsulfonylbenzoyl]-1,3-dimethyl-5-hydroxy-1H-pyrazole and
4-[2-chloro-3-(thiazoline-4,5-dion-2-yl)-4-methylsulfonylbenzoyl]-1,3-dimethyl-5-hydroxy-1H-pyrazole;

or an agriculturally useful salt thereof.

40 2. A 3-heterocyclyl-substituted benzoyl derivative of the formula I where the variables have the following meanings:

45 R¹, R² are hydrogen, nitro, halogen, cyano, C₁-C₆-alkyl,
C₁-C₆-haloalkyl, C₁-C₆-alkoxy, C₁-C₆-haloalkoxy,
C₁-C₆-alkylthio, C₁-C₆-haloalkylthio.

$C_1\text{-}C_6\text{-alkylsulfinyl}$, $C_1\text{-}C_6\text{-haloalkylsulfinyl}$,
 $C_1\text{-}C_6\text{-alkylsulfonyl}$ or $C_1\text{-}C_6\text{-haloalkylsulfonyl}$;

5 R³ is hydrogen, halogen or $C_1\text{-}C_6\text{-alkyl}$;

10 R⁴, R⁵ are hydrogen, halogen, cyano, nitro, $C_1\text{-}C_4\text{-alkyl}$,
 $C_1\text{-}C_4\text{-alkoxy-C}_1\text{-}C_4\text{-alkyl}$, di($C_1\text{-}C_4\text{-alkoxy})\text{-}C_1\text{-}C_4\text{-}$
 alkyl , di($C_1\text{-}C_4\text{-alkyl})\text{-amino-}C_1\text{-}C_4\text{-alkyl}$,
 $[2,2\text{-di}(C_1\text{-}C_4\text{-alkyl})\text{-}1\text{-hydrazino}]\text{-}C_1\text{-}C_4\text{-alkyl}$,
 $C_1\text{-}C_6\text{-alkyliminooxy-}C_1\text{-}C_4\text{-alkyl}$, $C_1\text{-}C_4\text{-alkoxycarbonyl-}$
 $C_1\text{-}C_4\text{-alkyl}$, $C_1\text{-}C_4\text{-alkylthio-}C_1\text{-}C_4\text{-alkyl}$,
 $C_1\text{-}C_4\text{-haloalkyl}$, $C_1\text{-}C_4\text{-cyanoalkyl}$, $C_3\text{-}C_8\text{-cycloalkyl}$,
 $C_1\text{-}C_4\text{-alkoxy}$, $C_1\text{-}C_4\text{-alkoxy-C}_2\text{-}C_4\text{-alkoxy}$,
 $C_1\text{-}C_4\text{-haloalkoxy}$, $C_1\text{-}C_4\text{-alkylthio}$,
 $C_1\text{-}C_4\text{-haloalkylthio}$, di($C_1\text{-}C_4\text{-alkyl})\text{amino}$, COR⁶,
phenyl or benzyl, it being possible for the two
last-mentioned substituents to be fully or partially
halogenated and/or to have attached to them one to
three of the following groups:
20 nitro, cyano, $C_1\text{-}C_4\text{-alkyl}$, $C_1\text{-}C_4\text{-haloalkyl}$,
 $C_1\text{-}C_4\text{-alkoxy}$ or $C_1\text{-}C_4\text{-haloalkoxy}$;

25 or

30 R⁴ and R⁵ together form a $C_2\text{-}C_6\text{-alkanediyl}$ chain which can be
mono- to tetrasubstituted by $C_1\text{-}C_4\text{-alkyl}$ and/or
which can be interrupted by oxygen or by a
nitrogen which is unsubstituted or substituted by
 $C_1\text{-}C_4\text{-alkyl}$;

35 or

35 R⁴ and R⁵ together with the corresponding carbon form a
carbonyl or thiocarbonyl group;

40 R⁶ is $C_1\text{-}C_4\text{-alkyl}$, $C_1\text{-}C_4\text{-haloalkyl}$, $C_1\text{-}C_4\text{-alkoxy}$,
 $C_1\text{-}C_4\text{-alkoxy-C}_2\text{-}C_4\text{-alkoxy}$, $C_1\text{-}C_4\text{-haloalkoxy}$,
 $C_3\text{-}C_6\text{-alkenyloxy}$, $C_3\text{-}C_6\text{-alkynyoxy}$ or NR⁷R⁸;

45 R⁷ is hydrogen or $C_1\text{-}C_4\text{-alkyl}$;

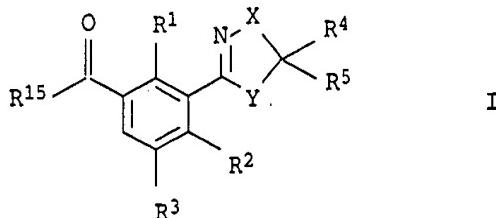
45 R⁸ is $C_1\text{-}C_4\text{-alkyl}$;

3-Heterocyclyl-substituted benzoyl derivatives

5 Abstract

Benzoyl derivatives of the formula I

10



15

where the variables have the following meanings:

20 R¹, R² are hydrogen, nitro, halogen, cyano, alkyl, haloalkyl, alkoxy, haloalkoxy, alkylthio, haloalkylthio, alkylsulfinyl, haloalkylsulfinyl, alkylsulfonyl or C₁-C₆-haloalkylsulfonyl;

25 R³ is hydrogen, halogen or alkyl;

30 R⁴, R⁵ are hydrogen, halogen, cyano, nitro, alkyl, alkoxy, alkylthio, dialkylamino, phenyl or carbonyl, it being possible for the 6 last-mentioned radicals to be substituted;

X is O, S, NR⁹, CO or CR¹⁰R¹¹;

35 Y is O, S, NR¹², CO or CR¹³R¹⁴;

40 R¹⁵ is pyrazole which is unsubstituted or substituted, linked in the 4-position and has attached to it in the 5-position a hydroxyl or sulfonyloxy radical;

and the agriculturally useful salts thereof; processes and intermediates for the preparation of the 3-heterocyclyl-substituted benzoyl derivatives; compositions comprising them; and the use of these derivatives or compositions comprising them for controlling undesirable plants."

where X and Y are not simultaneously oxygen or sulfur;

with the exception of

- 5 4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1-ethyl-5-hydroxy-1H-pyrazole,
- 10 4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1,3-dimethyl-5-hydroxy-1H-pyrazole,
- 15 4-[2-chloro-3-(5-cyano-4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1,3-dimethyl-5-hydroxy-1H-pyrazole,
- 20 4-[2-chloro-3-(4,5-dihydrothiazol-2-yl)-4-methylsulfonylbenzoyl]-1,3-dimethyl-5-hydroxy-1H-pyrazole and
- 25 4-[2-chloro-3-(thiazoline-4,5-dion-2-yl)-4-methylsulfonylbenzoyl]-1,3-dimethyl-5-hydroxy-1H-pyrazole;

15 or an agriculturally useful salt thereof.

- 3. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in claim 1 or 2, where R³ is hydrogen.
- 20 4. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 3, where
- 25 R¹,R² are nitro, halogen, cyano, C₁-C₆-alkyl, C₁-C₆-haloalkyl, C₁-C₆-alkoxy, C₁-C₆-haloalkoxy, C₁-C₆-alkylthio, C₁-C₆-haloalkylthio, C₁-C₆-alkylsulfinyl, C₁-C₆-haloalkylsulfinyl, C₁-C₆-alkylsulfonyl or C₁-C₆-haloalkylsulfonyl.
- 30 5. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4, where Z is SO₂R¹⁷.
- 35 6. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4, where Z is hydrogen.
- 40 7. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4 or 6, where X is oxygen and Y is CR¹³R¹⁴.
- 45 8. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4 or 6 or 7, where

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- R⁴ is halogen, nitro, C₁-C₄-alkyl,
 C₁-C₄-alkoxy-C₁-C₄-alkyl,
 C₁-C₄-alkoxycarbonyl-C₁-C₄-alkyl,
 C₁-C₄-alkylthio-C₁-C₄-alkyl, C₁-C₄-haloalkyl,
 C₁-C₄-cyanoalkyl, C₃-C₈-cycloalkyl, C₁-C₄-alkoxy,
 C₁-C₄-alkoxy-C₂-C₄-alkoxy, C₁-C₄-haloalkoxy,
 C₁-C₄-alkylthio, C₁-C₄-haloalkylthio,
 di(C₁-C₄-alkyl)amino, COR⁶, phenyl or benzyl, it
 being possible for the two last-mentioned
 10 substituents to be partially or fully halogenated
 and/or to have attached to them one to three of
 the following groups:
 nitro, cyano, C₁-C₄-alkyl, C₁-C₄-haloalkyl,
 C₁-C₄-alkoxy or C₁-C₄-haloalkoxy;
- 15 R⁵ is hydrogen or C₁-C₄-alkyl;
 or
- 20 R⁴ and R⁵ together form a C₂-C₆-alkanediyl chain which can be
 mono- to tetrasubstituted by C₁-C₄-alkyl and/or
 which can be interrupted by oxygen or by a
 nitrogen which is unsubstituted or substituted by
 C₁-C₄-alkyl;
- 25 or
- 30 R⁵ and R¹³ together form a C₂-C₆-alkanediyl chain which can be
 mono- to tetrasubstituted by C₁-C₄-alkyl and/or
 which can be interrupted by oxygen or by a
 nitrogen which is unsubstituted or substituted by
 C₁-C₄-alkyl.
- 35 9. A 3-heterocyclyl-substituted benzoyl derivative of the
 formula I as claimed in any of claims 1 to 4 or 6 to 8, where
- 40 R⁴ is C₁-C₄-alkyl, C₁-C₄-haloalkyl,
 C₁-C₄-alkoxycarbonyl or CONR⁷R⁸;
- 45 R⁵ is hydrogen or C₁-C₄-alkyl;
 or

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R⁴ and R⁵ together form a C₂-C₆-alkanediyl chain which can be mono- to tetrasubstituted by C₁-C₄-alkyl and/or which can be interrupted by oxygen or by a nitrogen which is unsubstituted or substituted by C₁-C₄-alkyl;

5

or

10 R⁵ and R¹³ together form a C₂-C₆-alkanediyl chain which can be mono- to tetrasubstituted by C₁-C₄-alkyl and/or which can be interrupted by oxygen or by a nitrogen which is unsubstituted or substituted by C₁-C₄-alkyl.

15

10. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4 or 6 or 7, where R⁴ and R⁵ are hydrogen.

20

11. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4 or 6 or 7 or 10, where R¹⁸ is hydrogen.

25

12. 4-[2-Chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

13. An agriculturally useful salt of 4-[2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoyl]-1-methyl-5-hydroxy-1H-pyrazole.

30

14. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4 or 6, where

35

X is S, NR⁹, CO or CR¹⁰R¹¹;

OR

40

Y is O, S, NR¹² or CO.

15. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4 or 6 or 14, where R¹⁸ is hydrogen.

16. A 3-heterocyclyl-substituted benzoyl derivative of the formula I as claimed in any of claims 1 to 4 or 6 or 14, where

5 R⁴ is halogen, cyano, nitro, C₁-C₄-alkyl,
 C₁-C₄-alkoxy-C₁-C₄-alkyl,
 C₁-C₄-alkoxycarbonyl-C₁-C₄-alkyl,
 C₁-C₄-alkylthio-C₁-C₄-alkyl, C₁-C₄-haloalkyl,
 C₁-C₄-cyanoalkyl, C₃-C₈-cycloalkyl, C₁-C₄-alkoxy,
 10 C₁-C₄-alkoxy-C₂-C₄-alkoxy, C₁-C₄-haloalkoxy,
 C₁-C₄-alkylthio, C₁-C₄-haloalkylthio,
 di(C₁-C₄-alkyl)amino, COR⁶, phenyl or benzyl, it
 being possible for the two last-mentioned
 15 substituents to be partially or fully halogenated
 and/or to have attached to them one to three of
 the following groups:
 nitro, cyano, C₁-C₄-alkyl, C₁-C₄-haloalkyl,
 C₁-C₄-alkoxy or C₁-C₄-haloalkoxy;

20 R⁵ is hydrogen or C₁-C₄-alkyl;

or

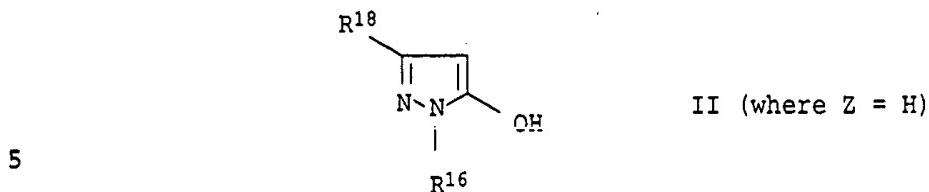
25 R⁴ and R⁵ together form a C₂-C₆-alkanediyl chain which can be mono- to tetrasubstituted by C₁-C₄-alkyl and/or which can be interrupted by oxygen or by a nitrogen which is unsubstituted or substituted by C₁-C₄-alkyl;

30 or

35 R⁴ and R⁹ or R⁴ and R¹⁰ or R⁵ and R¹² or R⁵ and R¹³ together form a C₂-C₆-alkanediyl chain which can be mono- to tetrasubstituted by C₁-C₄-alkyl and/or which can be interrupted by oxygen or by a nitrogen which is unsubstituted or substituted by C₁-C₄-alkyl;

40 R¹⁸ is C₁-C₆-alkyl.

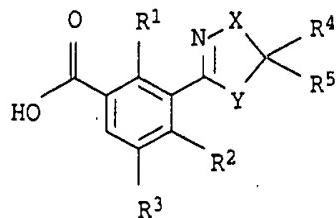
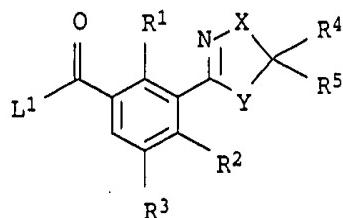
17. A process for the preparation of 3-heterocyclyl-substituted benzoyl derivatives of the formula I as claimed in claim 1, which comprises acylating the pyrazole of the formula II
 45 where Z = H, where the variables R¹⁶ and R¹⁸ have the meanings given under claim 1,



10 with an activated carboxylic acid III α or with a carboxylic acid III β ,

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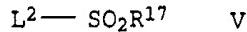


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where the variables R¹ to R⁵, X and Y have the meanings given under claim 1 and L¹ is a nucleophilically displaceable leaving group, subjecting the acylation product to a rearrangement reaction in the presence or absence of a catalyst to give the compounds I (where Z = H) and, if desired, to prepare 3-heterocyclyl-substituted benzoyl derivatives of the formula I where Z = SO₂R¹⁷, reacting the product with a compound of the formula V,

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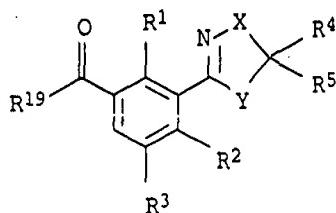
where R¹⁷ has the meaning given under claim 1 and L² is a nucleophilically displaceable leaving group.

18. A 3-heterocyclyl-substituted benzoic acid derivative of the formula III,

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where R^{19} is hydroxyl or a radical which can be removed by hydrolysis and variables R^1 to R^5 , X and Y have the meanings given under the claims 1 to 16, with the exception of methyl 2-chloro-3-(4,5-dihydroisoxazol-3-yl)-4-methylsulfonylbenzoate, methyl 2-chloro-3-(4,5-dihydrooxazol-2-yl)-4-methylsulfonylbenzoate and methyl 2,4-dichloro-3-(5-methylcarbonyloxy-4,5-dihydroisoxazol-3-yl)benzoate.

20 19. A 3-heterocyclyl-substituted benzoic acid derivative of the formula III as claimed in claim 18 where the variables R^1 to R^5 , X and Y have the meanings given under claims 2 to 16.

25 20. A 3-heterocyclyl-substituted benzoic acid derivative of the formula III as claimed in either of claims 18 or 19, where

R^{19} is halogen, hydroxyl or C_1-C_6 -alkoxy.

30 21. A composition comprising a herbicidally active amount of at least one 3-heterocyclyl-substituted benzoyl derivative of the formula I or of an agriculturally useful salt of I as claimed in any of claims 1 to 16, and auxiliaries conventionally used for the formulation of crop protection products.

40 22. A process for the preparation of a composition as claimed in claim 21, which comprises mixing a herbicidally active amount of at least one 3-heterocyclyl-substituted benzoyl derivative of the formula I or of an agriculturally useful salt of I as claimed in any of claims 1 to 16 and auxiliaries conventionally used for the formulation of crop protection products.

45 23. A method of controlling undesirable vegetation, which comprises allowing a herbicidally active amount of at least one 3-heterocyclyl-substituted benzoyl derivative of the

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formula I or of an agriculturally useful salt of I as claimed in any of claims 1 to 16 to act on plants, their environment and/or on seeds.

- 5 24. The use of a 3-heterocyclyl-substituted benzoyl derivative of the formula I or an agriculturally useful salt thereof as claimed in any of claims 1 to 16 as herbicide.

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